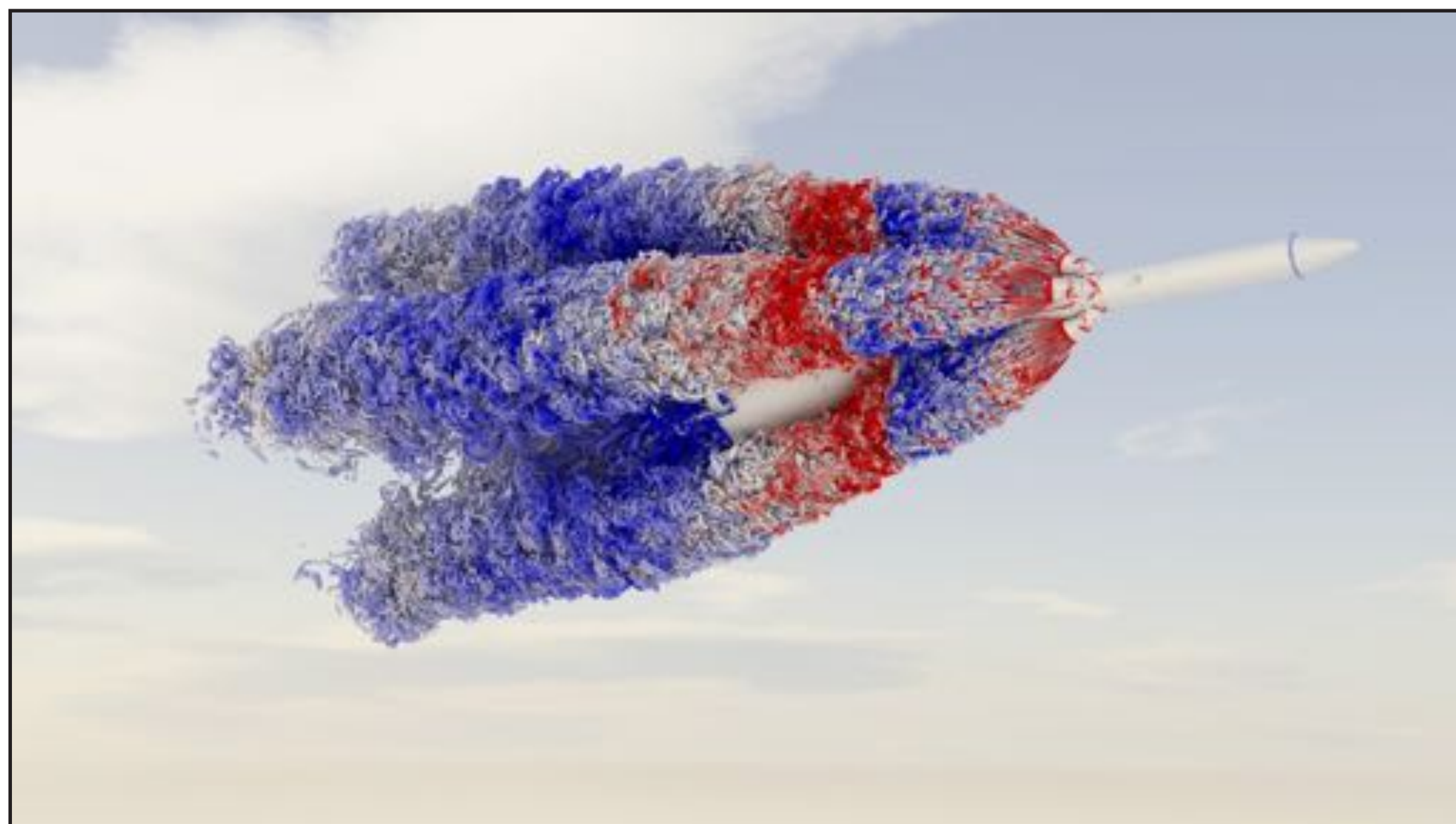
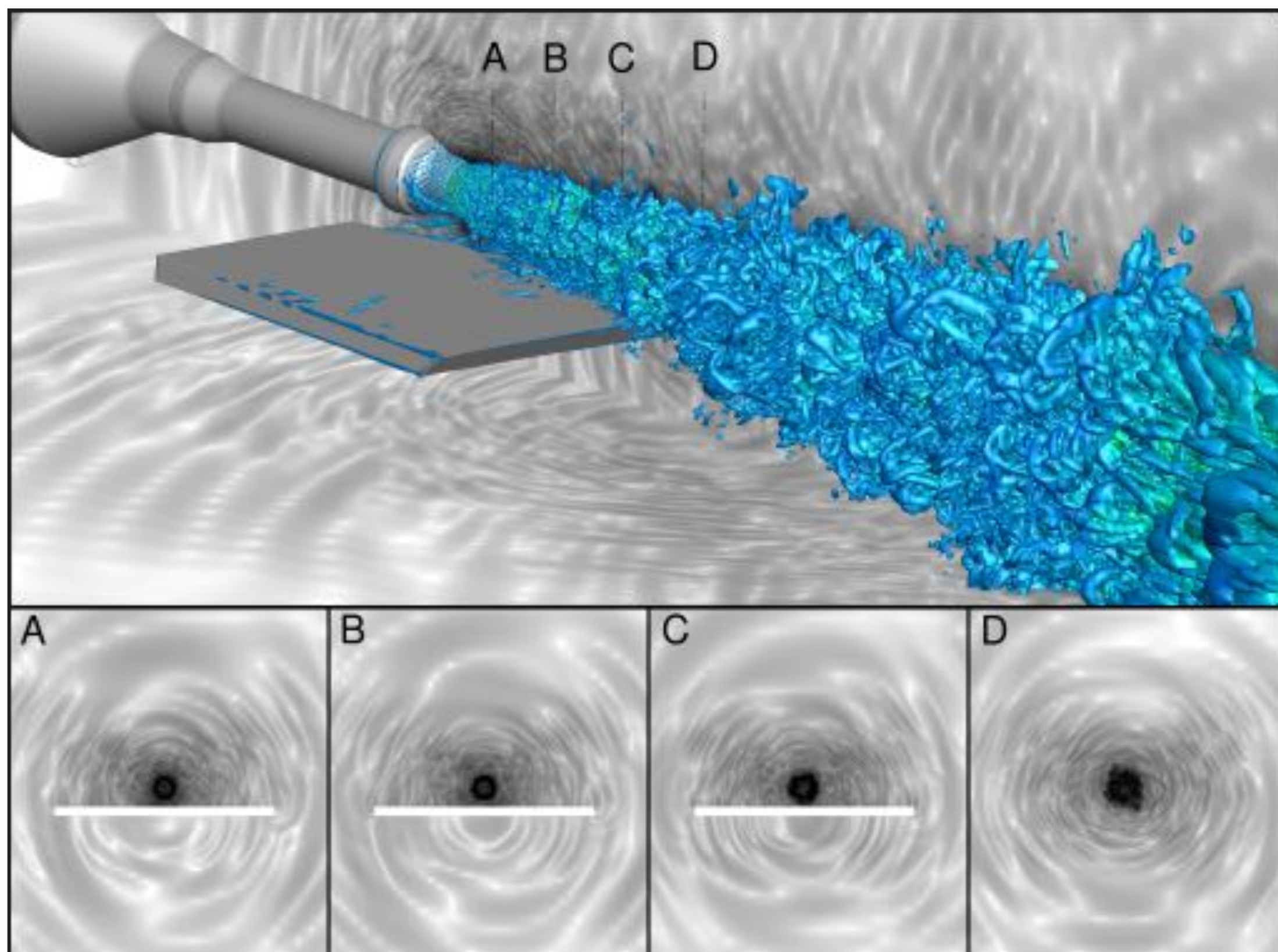


Snapshot from a simulation of launch ignition for NASA's next-generation Space Launch System. Colors indicate pressure, where blue is low and red is high. *Michael Barad, Tim Sandstrom, NASA/Ames*

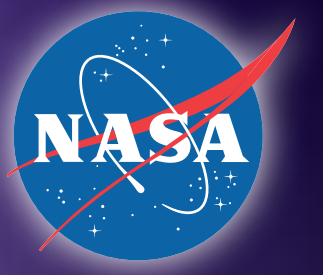


Snapshot from a simulation of the Orion launch abort vehicle that will carry astronauts to safety in the event of a problem during launch. In this ascent abort scenario, the ignition of the abort motors is triggered when the vehicle is already traveling at transonic speeds. Colored plumes indicate high pressure (red) and low pressure (blue). These changes in pressure cause vibrations on the vehicle. Regions where the color changes abruptly in space indicate the presence of shock waves. *Francois Cadieux, Tim Sandstrom, NASA/Ames*



Hybrid Reynolds-averaged Navier-Stokes/large-eddy simulation of an axisymmetric near-sonic round jet interacting with a jet shielding plate (SP7 SMC0000). The simulation was performed on a structured curvilinear overset mesh within the LAVA solver framework. Top: Isocontour of Q-criterion colored by normalized stream-wise velocity and pressure gradient magnitude on planar cuts (A, B, C, D) through the center line and below the shielding plate. Bottom: Pressure gradient magnitude on the four different stream-wise cutting planes. *Jeffrey Housman, Gerrit Sticht, NASA/Ames*

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Predicting Aircraft and Spacecraft Acoustics

Steady-state Reynolds-averaged Navier-Stokes aerodynamic analysis has been the workhorse for the design of aerospace vehicles over the last 20 years. But this approach can provide only limited information for unsteady flows and acoustic vibrations. Scale-resolving methods fill this gap, but are very computationally expensive. We developed the Launch Ascent and Vehicle Aerodynamics (LAVA) simulation suite to increase the computational efficiency of scale-resolving simulations to improve the design phase of NASA's next-generation concept aircraft and space vehicles. LAVA results have already positively impacted the design of the Kennedy Space Center launch pad flame trench, the Orion launch abort vehicle, and future urban air mobility vehicles.



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